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EXAMINER	
TUCKER, WESLEY J	
ART UNIT	**PAPER NUMBER**
2623	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/834,816	O'CALLAGHAN, ANDRAIS	
	Examiner	Art Unit	
	Wes Tucker	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 November 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16,18-48,50-53,55 and 56* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *6-16,19-32,38-48 and 51-53* is/are allowed.

6)☒ Claim(s) *1-5,18,33-37,50,55 and 56* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 April 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 21st 2005 has been entered.

Response to Amendment

2. Applicant's amendment filed September 15th 2005 has been entered and made of record.

3. Applicant has hereby amended claims 55 and 56. Claims 17, 49 and 54 are canceled. Claims 6-16, 19-32, 38-46 and 51-53 were previously allowed. Claims 1-16, 18-48, 50-53, 55 and 56 are currently pending.

4. Applicant's remarks accompanying the amendment filed September 15th 2005 were previously addressed in the Advisory Office Action filed October 26th 2005. Applicant has not responded to the discussion presented by the Examiner in the Advisory action mentioned. Therefore the discussion presented in the Advisory Action by the Examiner still applies to the relevant claims.

5. The amended claims 55 and 56 are addressed accordingly. The rejections of all other pending claims are maintained as stated in the Advisory Action. The discussion presented in the Advisory Action is also presented below for the Applicant's convenience.

Advisory Action

6. The discussion previously presented as it appeared in the Advisory action filed on October 26th, 2005 is as follows:

Applicant has submitted arguments with regard to independent claims 1 and 33. The content of the arguments are well documented in the Applicants response and are the same arguments presented in the telephone interview in regard to the previosly presented final rejection.

The Applicants arguments are focused on the amount of luminance or intensity value reduction perfomed on the pupil region of a detected red eye and the bordering pixels of said pupil red eye region in the previously cited passage in the reference to U.S.Patent 5,748,764 to Benati. The Examiner has interpretted the phrase from column 8, lines 63-66 stating "At this point, the luminance channel is multiplied by a factor of 0.35 in order to reduce the lightness of the pixel's neutral value" to mean that the pixels luminance value is reduced or darkened by a factor of 0.35. The justification for this interpretation comes from the passage at column 9, lines 8-12 which reads "Border correction is perfomed on border pixels... Such pixels are ONLY darkened by a 0.15

factor." It is exceedingly clear to the Examiner that a border correction is performed that is less severe than the pupil correction with respect to the amount of darkening performed. If it were interpretted in the reverse (as the Applicant wants to interpret it) to have the pupil pixels which are very bright reduced to 35% of their initial luminance and the bordering pixels (which by their nature are interpretted as already being darker than the pupil pixels) to be reduced to 15% of their initial luminance, what would result would be a very dark line around the pupil resulting in an unsightly image.

The Examiner chooses to interpret the disclosure of Benati as one of ordinary skill in the art would in order to achieve the more favorable result in image processing. The way Benati (as interpreted by the Examiner) is performing the border correction is almost identical in nature to the method being performed by the presently claimed invention. In the Applicants specification on page 10 lines 19 and 20 it is taught that the border pixels "would look bad if they were darkened too much." Examiner points out that this only strengthens the reasons for the interpretation of Benati previously presented in the final rejection. It would be unreasonable to interpret Benati in the opposite. There is no apparent reason for Benati to perform an operation to remove red eye that produces an unsightly dark ring around the pupil.

Further in the applicants specification on page 10, lines 25 to 31 it is disclosed that "the replacement pixels are given gray values equal to 0.6 and 0.9 times their original brightness." This sounds like a comparable ratio to the 0.35 and 0.15 ratio of darkening presented by Benati. In fact as interpretted by the Examiner this would result in border pixels with effective grey values of 0.65 and 0.85 times their original

brightness. This is so strikingly similar to the values offered by Applicants specification, that it appears that these ratios are exceedingly well known in the art to give the best effective darkening of red eye pixels.

It is also noted that Applicant makes a remark about the result of the Benati method given the Examiner's interpretation. The remark can be found at the top of page 22 just before luminary definitions of the terms "factor" and "scale factor." Applicant is advised that this logic applies directly to the present specification as well on page 10, lines 28-31. The remarks made with regard to claim 55 have not been addressed because the claim has been amended to change the scope. The Final Rejection is accordingly maintained.

From the text previously presented in the Advisory Action filed on October 26th 2005, it must be abundantly clear that the reference to Benati discussed above aptly discloses the claimed elements disputed by Applicant.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 55 and 56 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,990,973 to Sakamoto.

With regard to claim 55, Sakamoto discloses a method of redeye reduction for a digital image, said method comprising:

Cycling through the pixels of said digital image to identify a first redeye region (column 3, lines 12-20);

Responding to the identifying of said first red eye region by initiating search for a second red eye region (column 3, lines 20-35); and modifying the color of the identified first and second red eye regions (column 3, lines 40-45).

Wherein the search for said second red eye region includes using a measure of a characteristic parameter of the identified first red eye region as a reference parameter to locate said second red eye region (column 3, lines 20-30). The color information from the first red-eye area is used to search for the second red-eye region.

Rejections Under U.S.C. § 103(a)

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claim 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,990,973 to Sakamoto and U.S. Patent 5,748,764 to Benati et al.

With regard to claim 56, Sakomoto discloses a method of redeye reduction for a digital image, said method comprising:

Identifying a first red eye region (column 3, lines 12-20);

Identifying a second red eye region (column 3, lines 20-30);

Adjusting the size of the identified first and second red eye regions (column 3, lines 35-45 see area expansion means, interpreted as dilating); and

Modifying the color of the adjusted first and second red eye regions (column 3, lines 40-46).

Sakamoto does not explicitly disclose modifying the color to a dark gray color, and the color of their border pixels to a light gray color.

Benati discloses this practice (column 8, lines 62-67 and column 8, lines 10-15 and Figs. 10 and 11). As discussed above with regard to Applicants previously presented arguments, Benati discloses darkening the core pixels for correction to a more severe degree that the bordering pixels. Further support for this is shown in Figs. 10 and 11. The border pixels have a lesser degree of correction than the core pixels.

The Examiner has interpretted the phrase from column 8, lines 63-66 stating "At this point, the luminance channel is multiplied by a factor of 0.35 in order to reduce the lightness of the pixel's neutral value" to mean that the pixels luminance value is reduced

or darkened by a factor of 0.35. The justification for this interpretation comes from the passage at column 9, lines 8-12 which reads "Border correction is perfomed on border pixels... Such pixels are ONLY darkened by a 0.15 factor." It is exceedingly clear to the Examiner that a border correction is performed that is less severe than the pupil correction with respect to the amount of darkening performed. If it were interpretted in the reverse (as the Applicant wants to interpret it) to have the pupil pixels which are very bright reduced to 35% of their initial luminance and the bordering pixels (which by their nature are interpretted as already being darker than the pupil pixels) to be reduced to 15% of their initial luminance, what would result would be a very dark line around the pupil resulting in an unsightly image.

The Examiner chooses to interpret the disclosure of Benati as one of ordinary skill in the art would in order to achieve the more favorable result in image processing. The way Benati (as interpreted by the Examiner) is performing the border correction is almost identical in nature to the method being performed by the presently claimed invention. In the Applicants specification on page 10 lines 19 and 20 it is taught that the border pixels "would look bad if they were darkened too much." Examiner points out that this only strengthens the reasons for the interpretation of Benati previously presented in the final rejection. It would be unreasonable to interpret Benati in the opposite. There is no apparent reason for Benati to perform an operation to remove red eye that produces an unsightly dark ring around the pupil.

Further in the applicants specification on page 10, lines 25 to 31 it is disclosed that "the replacement pixels are given gray values equal to 0.6 and 0.9 times their

original brightness." This sounds like a comparable ratio to the 0.35 and 0.15 ratio of darkening presented by Benati. In fact as interpretted by the Examiner this would result in border pixels with effective grey values of 0.65 and 0.85 times their original brightness. This is so strikingly similar to the values offered by Applicants specification, that it appears that these ratios are exceedingly well known in the art to give the best effective darkening of red eye pixels.

Therefore it would have been obvious to one of ordinary skill in the art to use the pixel and border adaptive correction as taught by Benati in combination with Sakamoto in order to give a smoother better looking image around the edge of the red-eye correction area. Further as stated above using Benati in the opposite interpretation as Argued by the Applicant would give a dark ring around the edge of the area creating an unsightly less attrative nad less natural looking image.

9. Claims 1-4, 17, 18, 33-36, 49 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Patti et al. ("Automatic Digital Redeye Reduction", IEEE 1998), in view of Acker et al. (U.S. Patent 6,009,209), in further view of Benati et al. (U.S. Patent 5,748,764).

The following is in regard to Claim 33. Patti et al. disclose a redeye reduction method for reducing the effects of redeye in a digital image that includes at least one redeye region. This method comprises:

a. The step of generating a binary mask (matrix) for identifying candidate redeye pixels. See the section *Create Mask Algorithm* in Patti et al[1]. The algorithm to create this mask involves converting the pixels of the image to a non-standard luminance-chrominance representation (color-based parameter) and thresholding these converted pixels into candidate pixels and non-candidate pixels. Converted pixels having a value less than this threshold are assigned a logic value of zero ($b_{ij}^{(0)} = 0$), indicating that they are non-candidate pixels, and converted pixels having a value greater than or equal to this threshold are assigned a logic value of one ($b_{ij}^{(0)} = 1$), indicating that they are candidate pixels. See Patti et al. equation (2.2).

b. A segmentation step. Though Patti et al do not explicitly indicate this step, it should be apparent that the binary mask effectively segments the image into multiple groups of contiguous candidate

pixels – i.e. cohesive segments (henceforth, referred to as segments). These groups are identified as isolated regions of the binary mask having $b_{ij}^{(0)} = 1$. See Patti et al. Figs. 2-4. Using the mask, the pupil (i.e. first target cohesive group/first redeye region) is then identified (second stage of flow diagram depicted in Patti et al. Fig. 2).

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1 For convenience, the equations found on the second page of Patti et al. will be referred to as equations (2.1), (2.2) and (2.3), respectively.

c. An image-modifying (correction) step. Since elements of the binary mask have a one-to-one correspondence with the converted image pixels (i.e. $b_{ij} \mapsto Cr_{ij}$), identification of the *image* pixels associated with the pupil follows trivially from identifying the pupil within the binary mask, as in step (b). The image-modifying step involves replacing these image pixels with pixels of a common predetermined color. See last paragraph of Section 4 of Patti et al.

Note, however, that Patti et al. does not show or suggest identifying the first target segment (i.e. pupil region), among the plurality of segments, as being the segment having the candidate pixel with the color-based parameter of highest value among all of said plurality of segments.

Acker et al. show, within the context of an automatic redeye removal/reduction method, that "automatic identification of the red eye region is based on characteristics common to all red eye artifacts – e.g., its shape tends to be compact and circular, with *high color saturation and a distinct brightness maxima*. These characteristics can be combined directly into a unified figure of merit that is optimized by searching for a roughly circular shape, surrounding the single point marked by the user, that maximizes these red eye characteristics" (Acker et al. column 6, lines 13-20). Thus, a region or segment of the image, having high color saturation and distinct brightness maxima, would be a likely candidate for the redeye (pupil) region. Such properties would correspond to a maximum in the aforementioned color-based parameter. This implies

that searching for a segment or region of the image, which is preferably circular and maximizes color saturation and brightness (and, correspondingly, the color-based parameter), represents a viable method for locating or identifying the redeye (pupil) region.

It would be a relatively simple undertaking for one of ordinary skill in the art to incorporate this teaching into the method of Patti et al. by either identifying and/or locating the pupil region by searching for the segment or region of the image that maximizes the color-based parameter, in lieu of the algorithm for pupil location taught by Patti et al., or by supplementing (say, by preceding) that algorithm with a search for the segment or region of the image that maximizes the color-based parameter. In either case, such a modification would represent an improvement over the method of Patti et al., in terms of efficiency, because the search space is effectively limited to the segments indicated by the binary mask, as opposed to an exhaustive search of the entire image plane. Given this advantage and the relative ease of such a modification, it would have been obvious to one of ordinary skill in the art, at the time of the applicant's claimed invention, to incorporate the teachings of Acker et al. into the method of Patti et al. by either identifying and/or locating the pupil region by searching for the segment or region of the image that maximizes the color-based parameter, in lieu of the algorithm for pupil location taught by Patti et al., or by supplementing (say, by preceding) that algorithm with a search for the segment or region of the image that maximizes the color-based parameter. In doing so, one would obtain a method of redeye reduction that satisfies all limitations of claim 33.

The following is in regard to the subject matter of canceled claims 17 and 49 now included in the independent claims 1 and 33. As shown above, the teachings of Patti et al. can be combined with those of Acker et al. in such a way as to satisfy all the limitations of claim 33. The image-modifying step (see discussion above relating to claim 33) of Patti et al.'s redeye reduction method involves replacing the color of pixels within the pupil region with a predetermined color having a first brightness intensity and having a first chrominance. See last paragraph of Section 4 in Patti et al. The image-modifying step, as taught by Patti et al., changes the color of the pixels bordering the pupil region to the same predetermined color as the pixels within the pupil region. Therefore, neither Acker et al. nor Patti et al. teach changing the pixels of the digital image bordering the pupil region to a common color having a second brightness intensity higher than said first brightness intensity.

Benati et al. disclose an automated method for the detection and correction of eye color defects due to flash illumination (with an emphasis on redeye effects). In Benati et al.'s method, border correction is performed on pixels neighboring at least one eye color defect pixel (i.e. a pixel in the pupil region). The colors of these neighboring pixels are changed so that they have the same chrominance as the pixels within the pupil region, but a higher luminance. See Benati et al. column 8, line 62-65 and column 9, lines 9-12. According to Benati et al. (Benati et al. column 2, lines 40-44), pixels on the border of the pupil region are corrected in this manner to create a more natural appearing correction.

Benati discloses that "the luminance channel is multiplied by a factor of 0.35 in order to reduce the lightness of the pixel's neutral value." This is in reference to the actual red eye pixels, which are decreased in brightness by a factor of 0.35 giving them an effective comparative brightness value of 0.65. Benati then states (column 9, lines 9-12) that the border pixels surrounding the red eye pixels are "only darkened by a 0.15 factor." This would give the bordering pixels an effective comparative brightness value of 0.85 which is effectively brighter than the first brightness intensity. Furthermore with the previous presented discussion regarding the canceled claims 17 and 49, it would have been obvious to modify the border pixels as desired to achieve amore natural looking picture as taught by Benati. Therefore the reference of Benati still reads on the added limitation in the amended independent claims 1 and 33.

Given the fact that the redeye reduction method, obtained by combining the teachings of Patti et al. and Acker et al. in the manner discussed above, identifies border pixels and attempts to correct them, it would be straightforward for one of ordinary skill in the art to simply modify this correction so that border pixels are treated in the manner suggested by Benati et al. According to Benati et al. (Benati et al. column 2, lines 40-44), pixels on the border of the pupil region are corrected in this manner to advantageously create a more natural appearing correction. Taking this into account, it would have been obvious to one of ordinary skill in the art, at the time of the applicant's claimed invention, to modify the image modifying/correction step of the redeye reduction

method, obtained by combining the teachings of Patti et al. and Acker et al. in the manner discussed above, so that border pixels are treated in the manner suggested by Benati et al. In doing so, one would obtain a redeye reduction method that conforms to the limitations of claim 49.

The following is in regard to Claims 17. This claim recites substantially the same limitations as claim 49. Therefore, with regard to claim 17, remarks analogous to those presented above relating to claim 49 are applicable.

See also the discussion above in regard to applicant's remarks. The addition of this subject matter does not distinguish the present invention over the prior art found and is therefore insufficient for allowance.

The following is in regard to Claim 34-35. As shown above, the teachings of Patti et al. can be combined with those of Acker et al. in such a way as to satisfy all the limitations of claim 33. The redeye reduction method of Patti et al. further includes the erosion of candidate segments. See Patti et al. equation (2.3). The erosion step refines the aforementioned binary mask and occurs between step (a) – i.e. creating a preliminary binary mask according to Patti et al. equation (2.2)) – step (b) - i.e. segmentation and pupil location. See the second column on page 2 of Patti et al. Patti et al. also perform this erosion twice. See the last paragraph on page 2 of Patti et al. Note that executing erosion according to equation (2.3) will erode pixels with less than

two neighbors. It would have been obvious to one of ordinary skill in the art to initially erode pixels with less than three neighbors, as opposed to two, initially, since this would result in a more pronounced elimination of extraneous pixels around the edges of the candidate segments as well as small, spurious segments unlikely to represent the pupil. The number of neighbors in each iteration of the erosion and even the number of iterations are clearly parameters of Patti et al.'s redeye reduction method that can be readily adjusted depending on the effectiveness of the subsequent segmentation. In this way, the teachings of Patti et al. and Acker et al., when combined in the manner described above, can be easily modified to conform to claims 34-35.

The following is in regard to Claim 36. As shown above, the teachings of Patti et al. can be combined with those of Acker et al. in such a way as to satisfy all the limitations of claim 34. Again referring to Patti et al. equation (2.3), notice eroded pixels are set to 0, the second logic level. In this way, the teachings of Patti et al. and Acker et al. can be combined in such a way as to satisfy all limitations of claim 36.

The following is in regard to Claim 50. As shown above, the teachings of Patti et al. can be combined with those of Acker et al. in such a way as to satisfy all the limitations of claim 33. Patti et al.'s method of redeye reduction begins by transforming the 1/3 power of the input RGB image to an YCrCb representation and then defining a first threshold $T = Cr_{avg} + Cr_{max} - Cr_{min}$ for use in the subsequent thresholding operation (step (a) above). See the last paragraph on page 1 of Patti et al. and Patti et al.

equation (2.1). Therefore, the teachings of Patti et al. and Acker et al., when combined in the manner described above, address all limitations of claim 50.

The following is in regard to Claims 1-4 and 18. These claims recite substantially the same limitations as claims 33-36 and 50, respectively. Therefore, with regard to claims 1-4 and 18, remarks analogous to those presented above relating to claims 33-36 and 50 are, respectively, applicable.

10. Claims 5 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Patti et al., Acker et al., and Benati et al. as applied to claims 1 and 33 above, in further view of Kinjo et al.

The following is in regard to Claim 37. As shown above, the teachings of Patti et al. can be combined with those of Acker et al. and Benati et al. in such a way as to satisfy all the limitations of claim 33. Patti et al. and Acker et al. and Benati do not teach a redeye reduction method wherein the component-connecting step (see the discussion above regarding claim 33) further includes generating statistical data for each of said plurality of cohesive groups including a high parameter value indicating the highest color-based parameter value of its corresponding candidate pixels, an average parameter value indicating the average color-based parameter value of its corresponding candidate pixels, and a size parameter value indicating its size.

17. Kinjo et al. discloses an image processing method for the reduction of redeye effects in a digital image. This image processing method includes a segmentation (component-connecting) step, wherein, for each segment, at least one of five *marks* is determined. These marks consist of a first mark indicating the roundness of the segment, a second mark indicating the position of the segment, a third mark indicating the surface area of the segment, a fourth mark for expressing the degree of poorness of color tone of the segment, and a fifth mark (the fifth mark is not relevant to this discussion). See, for example, Kinjo et al. column 5 lines 15-44. Note that the first through third marks, together, provide a measure of the size of the segment. Kinjo et al. suggests that the fourth mark can comprise at least one of an average value and maximum value of at lease one of the hue, saturation, and lightness (which together define the color of) the segment. See Kinjo et al. column 5 lines 15-44. In this way, the first through third marks represent a *size parameter*, similar to that of the applicant's claimed method, and the fourth mark can provide a *high parameter value* and an *average parameter value*, similar to those of the applicant's claimed method.

Deriving such marks for the segments, determined by the component-connecting step of the redeye-reduction method obtained by combining the teachings of Patti et al. and Acker et al. in the manner discussed above, would be a simple undertaking for one of ordinary skill in the art, given the teachings of Kinjo et al. The information contained in these marks would provide an effective, alternative means to evaluate the size and shape of the segments obtained by the segmentation/component-connecting step of the

redeye-reduction method obtained by combining the teachings of Patti et al. and Acker et al. This is an attractive alternative for locating the pupil region because using the marks of Kinjo et al., in the manner suggested by Kinjo et al., reduces the need for the exhaustive search scheme suggested by Patti et al. Similarly, the marks indicating the color properties of the segment can facilitate the search for pixels surrounding the periphery of the located pupil region, as taught by Patti et al. Given the facility of the information encompassed by Kinjo et al.'s marks and the relative ease of incorporating these marks into the method obtained by the combined teachings of Patti et al. and Acker et al., it would have been obvious to one of ordinary skill in the art, at the time of the applicant's claimed invention, to derive marks, as taught by Kinjo et al., containing information regarding size, shape, location, maximum/minimum color, and average color, for each of the segments determined by the component-connecting/segmentation step of the method obtained by the combining the teachings of Patti et al. and Acker et al., in the manner discussed above. In doing so, one would obtain a method that conforms to the limitations put forth in claim 37.

The following is in regard to Claims 5. This claim recites substantially the same limitations as claim 37. Therefore, with regard to claim 5, remarks analogous to those presented above relating to claim 37 are applicable.

New Claims

Claim 51 is found to be allowable for the same reasons as claims 6-16 and 38-46 as discussed below.

Claims 52 and 53 are found to be allowable because of the inclusion of the second thresholding step and the boundary adjusting module previously indicated as allowable subject matter with regard to claim 28.

Claims 55 and 56 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,990,973 to Sakamoto as discussed above and in view of the combination of Sakamoto and Benati as discussed above.

Allowable Subject Matter

The reasons for indicating allowable subject matter have been repeated here for the Applicant's convenience.

Claims 19-32 were allowed in the previous office action.

Claims 6-16, 19-32 and 38-48 and 51-53 are allowable as amended to include allowable subject matter indicated in the previous office action or as indicated allowable in the last office action.

18. New claim 51 is allowable for the same reasons as indicated in the first office action in regard to the allowable subject matter discussed in claims 6-16 and 38-48. None of the prior art cited or found teaches or fairly suggests performing a second target-determination according to these claims, in addition to the first target-determination. Specifically, prior art does not show searching for a regions, corresponding to a potential *second* pupil, having an average size and/or color that lies within a range dependant on the average size and/or color of the first pupil. It should be noted, however, that the effect of the pupil location algorithm in the method of Patti et al. is that segments having an average size that is not optimally correspondent to that of a pupil are filtered out. This, however, cannot be construed as fully satisfying the limitations of claims 6 or 38.

19. *The following is in regard to Claims 7-8 and 39-40.* As mentioned above, the encountered prior art failed to teach redeye reduction systems or methods that conform to the limitations of claim 6 or 38. However, it should be understood that the selection of the bounds of size and/or color parameter ranges that are dependant on the first pupil's size and/or color parameters can be made arbitrarily and, therefore, would have been obvious to one of ordinary skill in the art. Therefore, while the limitations of claims 7-8 and 39-40, relating to the numerical bounds of these ranges, are, in and of themselves, not allowable, these claims are allowable by virtue of their dependence on their allowable claims 6 and 38, respectively.

20. *The following is in regard to Claims 9 and 41.* As mentioned above, the encountered prior art failed to teach redeye reduction systems or methods that conform to the limitations of claim 6 or 38. Patti et al., however, do locate the region corresponding to a pupil via a block matching algorithm that attempts to find the smallest s × s block in the input mask with the maximum number of white pixels (see Patti et al. equation (2)) – that is, the block with the highest boundary square population. Thus, pupil location is accomplished in essentially the same way as the applicant's second-target determination. In this way, the identification of the second target cohesive group, as proposed by the applicant, is not unique. However, the applicant's initial determination of the first pupil by searching for the segment with the highest color-content (e.g. saturation), and the subsequent usage (prior to the said determination of the boundary square population) of the size and/or color information of the found first pupil to eliminate segments within a specified range of the first pupil's color and/or size, is not shown in prior redeye reduction methods.

21. *The following is in regard to Claims 10 and 42.* As mentioned above, the encountered prior art failed to teach redeye reduction systems or methods that conform to the limitations of claim 9 or 41. Notice that claims 10 and 41 claim a modification of the second image pixels that is analogous to the modification of the first image pixels. . Therefore, while the limitations of claims 10 and 42, relating to the modification of the second image pixels, are, in and of themselves, not allowable, claims 10 and 42 are allowable by virtue of their dependence on their allowable claims 9 and 41, respectively.

22. *The following is in regard to Claims 11-14 and 43-46.* These claims are similar to claims 25-27. Please refer to the discussion below, with regard to claims 25-28, for the justification of allowing these claims.

23. *The following is in regard to Claims 15-16 and 47-48.* These claims are allowable for essentially the same reasons as claims 12-13 and 44-45, respectively. See the remarks above relating to those claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wes Tucker whose telephone number is 571-272-7427. The examiner can normally be reached on 9AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on 571-272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Wes Tucker

12-6-2005

VIKKRAM BALI
PRIMARY EXAMINER